

A Novel Technique of Supra Superficial Musculoaponeurotic System Hyaluronic Acid Injection for Lower Face Lifting

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ABSTRACT

Background: Various methods attempting to correct sagging of the lower face focus mainly on manipulation of the superficial musculoaponeurotic system. Each technique has its own limitation. The authors propose a relatively simple, conservative method utilizing hyaluronic acid injection just above the superficial musculoaponeurotic system. **Objective:** To address a novel hyaluronic acid injection technique to lift the lower face. **Methods:** Details of the injection techniques are described. The position of the hyaluronic acid injected and the effect of hyaluronic acid on the superficial musculoaponeurotic system were confirmed by ultrasonography in one of the cases. **Results:** Sonogram images demonstrated the location of the injected hyaluronic acid and pressure effect of hyaluronic acid on the superficial musculoaponeurotic system, confirming the ability to manipulate the superficial musculoaponeurotic system by this injection technique. The lifting result of this single injection technique was immediately visible and maintained for at least 26 weeks. **Conclusion:** This is a less invasive, reproducible method that provides a sustained face lifting result. The authors propose the term “supraSMAS lift” for this novel injection technique. (*J Clin Aesthet Dermatol.* 2016;9(2):58–62.)

Facial aging is a complex and continuous process that affects the skin and underlying tissues through intrinsic and extrinsic factors.¹ Significant physical signs of lower face aging include varying degrees of laxity, sagging, prominent nasolabial folds, and marionette lines.

The superficial musculoaponeurotic system (SMAS) is one continuous, organized fibrous network in the face connecting the facial muscles with the dermis. It consists of a three-dimensional architecture of collagen fibers, elastic fibers, fat cells, and muscle fiber located in the subcutaneous layer and is connected to the dermis by vertical fibrous septa from the fat lobules.² Over the area of the retaining ligament of the face, the connection of SMAS and dermis is made by part of retaining ligaments called “retinacular cutis.”³ The SMAS extends upward to blend with the temporoparietal fascia and downward to the superficial cervical fascia.⁴ The thickness of SMAS varies among individuals and among different regions of the face.⁴

It is easily identified at the lateral part of the face, particularly over the parotid gland and temporal region and becomes thinner and gradually disappears in the midface.⁴

Surgical face lift techniques that aim to manipulate the SMAS can be simply categorized into SMAS imbrication, lateral SMASectomy with plication, and SMAS elevation.⁵ Although there is no consensus to which approach is the best, in general surgical face lift has been the standard treatment of the sagging face. However, the main limitations of surgical face lift are risk of complications, longer recovery time, and the enormous variation in the skill and experience of the individual surgeon.⁶ In recent years, nonsurgical skin tightening methods have been developed.⁷ Among the several modalities, a noninvasive microfocused ultrasound (MFU) has been recently introduced as a novel energy-based transcutaneous heat delivery system that reaches the deeper subdermal connective tissue in tightly focused zones at consistent

DISCLOSURE: The authors report no relevant conflicts of interest. No financial support was received in relation to this article.

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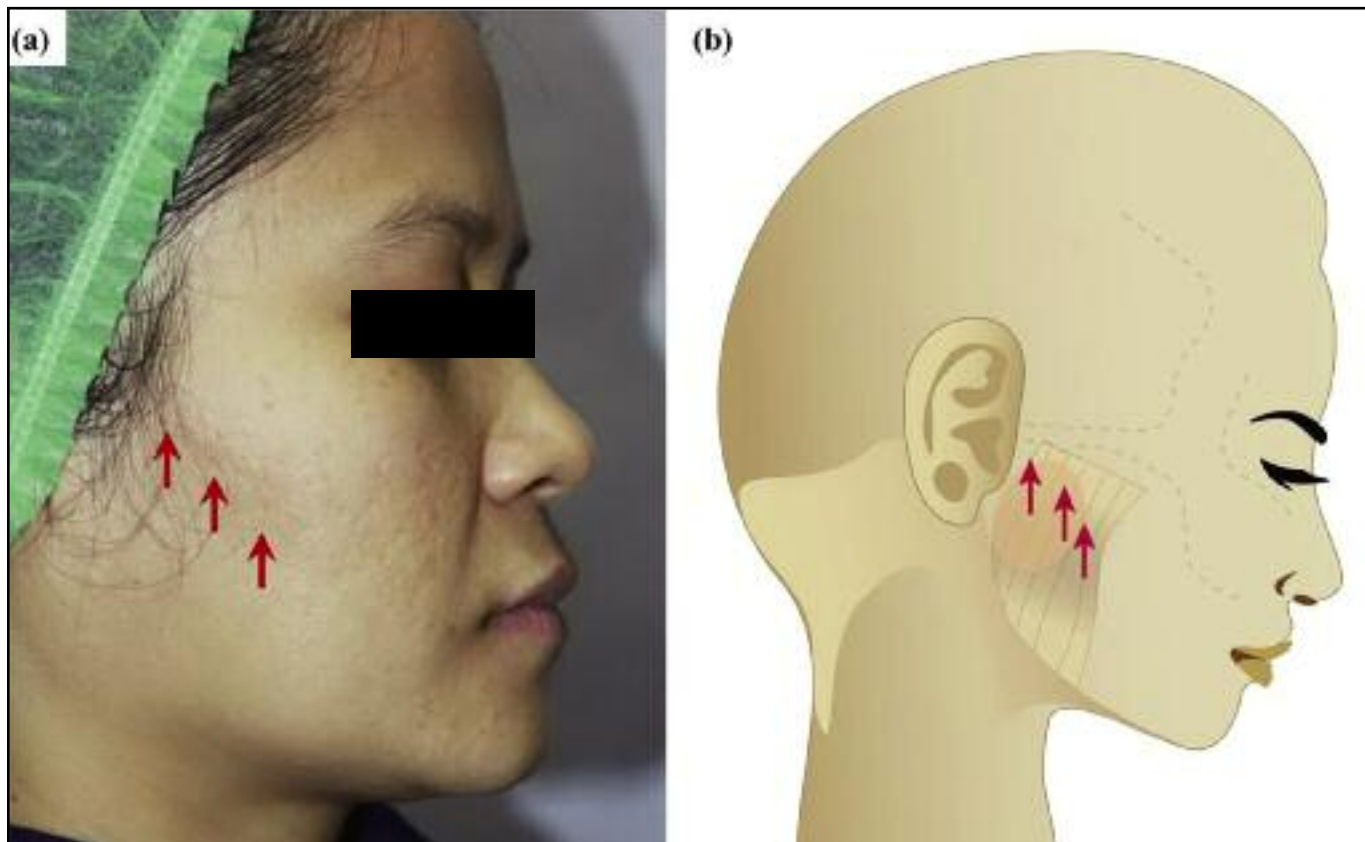


Figure 1. (a) Injection points of our patient and (b) related anatomical landmarks: Beige circle represents the parotid gland, blunt end of red arrows represent needle insertion points, tip of red arrows represent needle tip positions. Each injection released 0.1 to 0.2mL of HA per point.

programmed depths.^{8,9} The delivery of MFU to targeted areas in the SMAS results in immediate contraction of denatured collagen with subsequent initiation of neocollagenesis and collagen remodeling, leading to a durable lifting and tightening result.^{10,11} Nevertheless, the cost of MFU and pain during the procedure are considered as limitations for some patients. In this article, the authors propose another less invasive method of hyaluronic acid (HA) injection in the level above the SMAS, aiming to cause a mechanical effect to SMAS, which will produce a lower face lifting effect.

INJECTION TECHNIQUE

In the authors' clinical practice, they performed this injection technique with the patient sitting in the upright position. The HA injection points were selected on the preauricular and lateral cheek regions using the "finger lifting test," described as follows. The injectors assess the appropriate injection sites by applying their finger on the lateral facial skin and pushing it upwards to select the insertion points and vector that generate the best lifting effects in the lower face. An average of 3 to 5 injection points per facial side were then marked by this "finger lifting test."

The HA used in the authors' study was 100,000 gel particles/mL, 20mg/mL non-animal-stabilized HA (Restylane, Q-Med, Uppsala, Sweden) with a sterile 30-

gauge 0.5-inch needle. After proper cleansing and disinfection of the face, the needle was inserted through the skin at the preselected and marked points at approximately a 20±2 degree angle until a slight resistance at the needle tip was felt, representing the plane immediately above the SMAS. Patients' sensation was closely observed during needle insertion. Any insertions causing significant pain, which could be due to possible nerve fiber or vessel penetration, would be terminated and moved to a nearby insertion point. Aspiration at every injection site was done before the deposition of 0.1 to 0.2mL of HA per injection site in bolus fashion. Gentle massage was applied afterward to smoothen the skin. The authors termed this novel technique as the "supraSMAS lift."

In one of the authors' patients, ultrasonogram was used to visualize the SMAS and needle position and to confirm the location of the injected HA. High-resolution sonographic equipment with 12.5MHz linear array transducer (HDI 5000 and iu 22; Phillips ultrasound, Bothell, Washington) was applied on the patient's right preauricular region with free hand technique to demonstrate the SMAS level at 5mm depth below skin surface. Three injection points were marked based on the finger lifting test assessment (Figure 1) and the needle was inserted as described above. Then, the ultrasonography was again applied to confirm that the needle tip was located just immediately above the SMAS at



Figure 2. Ultrasonogram images. (a) Location of SMAS layer (yellow arrows) and course of needle (red arrows) before injection. (b) The angle between needle (red-dashed line) and SMAS layer (yellow-dashed line) was 21 degrees. (c) After injection, the deposited mass of HA (green asterisk) was identified above the SMAS (yellow arrows) and SMAS was pushed downward by the volume of HA.

a 21-degree angle (Figures 2A and 2B). The ultrasonography device was then removed before initiation of bolus HA injection without moving the needle tip. An aspiration was done before injecting every 0.1 to 0.2mL HA 100,000 gel particles/mL, 20 mg/mL non-animal-stabilized HA at each injection site. Finally, the sonogram's probe was placed back to confirm the location of the deposited HA mass (Figure 2C). The total HA volume of 0.5cc was injected on each side of the face. On the contralateral left facial side, another three injection points were completed using the identical technique without sonographic imaging of SMAS depth or needle tip location, instead, the ultrasonography was applied only once as a final confirmation of the deposited HA location.

RESULTS

The injected bolus of HA was demonstrated on the same plane immediately above the SMAS layer on both sides of the patient's face. In addition, sonogram images also demonstrated that the SMAS was downwardly displaced by the volume effect of HA mass (Figure 2C).

Immediately after injection, elevation of the lower face region was evident with less prominent nasolabial folds and marionette lines, better mandibular contour, and disappearance of submental sagging skin (Figures 3A and 3B). There were no immediate or delayed complications, except for a transient erythema at injection sites, which lasted less than 30 minutes and disappeared without treatment. The lifting effect was persistent throughout the follow-up period at 26 weeks post injection (Figure 3C).

PRACTICAL APPLICATIONS

One of the authors (WT) has performed this technique without application of any sonographic examination in more than 100 patients over a period of approximately three years. It has been observed that the longevity of the lifting effects could be appreciated for 6 to 8 months in patients receiving only this HA injection technique and for at least one year in patients who underwent this injection combined with other injections, such as volume augmentation or

intradermal HA injection. Complications have been limited to transient small needle marks at the entry point. No significant adverse effects have been reported.

Nevertheless, a few practical points need to be emphasized utilizing this technique. First, patients should be in an upright position during the evaluation and throughout injection. In this position, the injector can properly determine the severity of sagging and choose the most effective injection points through the finger lifting test. Second, the number of injection points are not fixed but varied in number and locations among each individual. In general, the lifting results can be accomplished after an average of 3 to 5 points per side, injecting approximately 0.1 to 0.2mL of HA per injection point. Third, immediately after injection, the injected areas should be gently massaged to smoothen the surface. Lastly, for injections performed without ultrasound guidance, the injector must exercise with caution, especially on the areas located superior or medial to the parotid gland, because the route of the facial nerve and transverse facial artery are located immediately below the SMAS layer in these locations.⁴ Therefore, an injection plane that is too deep may injure those structures. In summary, the authors warrant the following important steps, including the correct needle angle recommendation, aspiration before injection, and the inspection of the patient's sensation during the procedure (e.g., sharp pain or sparking pain) to be essential in this technique.

DISCUSSION

Among existing methods for lower face-lifting, traditional surgical facelift is the treatment of choice for patients who seek a very significant change in their appearance. Tightening of the SMAS with different techniques is the key component of face lifting procedures.⁵ However, its complexity, down time, and possibility of complications have limited its popularity, particularly in a subgroup of patients who prefer more conservative methods. Therefore, in this article, the authors propose a novel technique to achieve lower face lifting by injecting HA filler on lateral sides of the face to deposit small depot volumes of HA onto

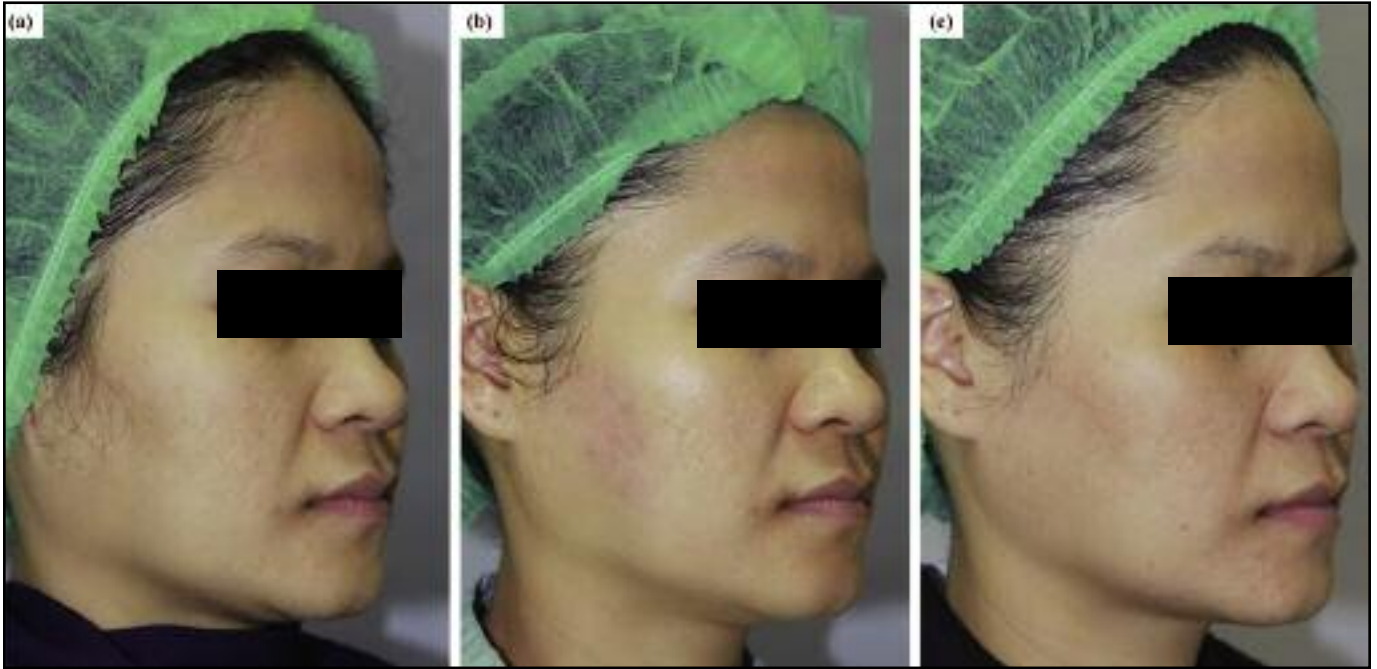


Figure 3. Clinical results (a) Baseline; (b) immediately after injection, nasolabial fold became less prominent. Submental area and jawl became tighter. (c) At 26-week post-treatment follow-up, progressive improvement of nasolabial fold and lower-face contour is demonstrated.

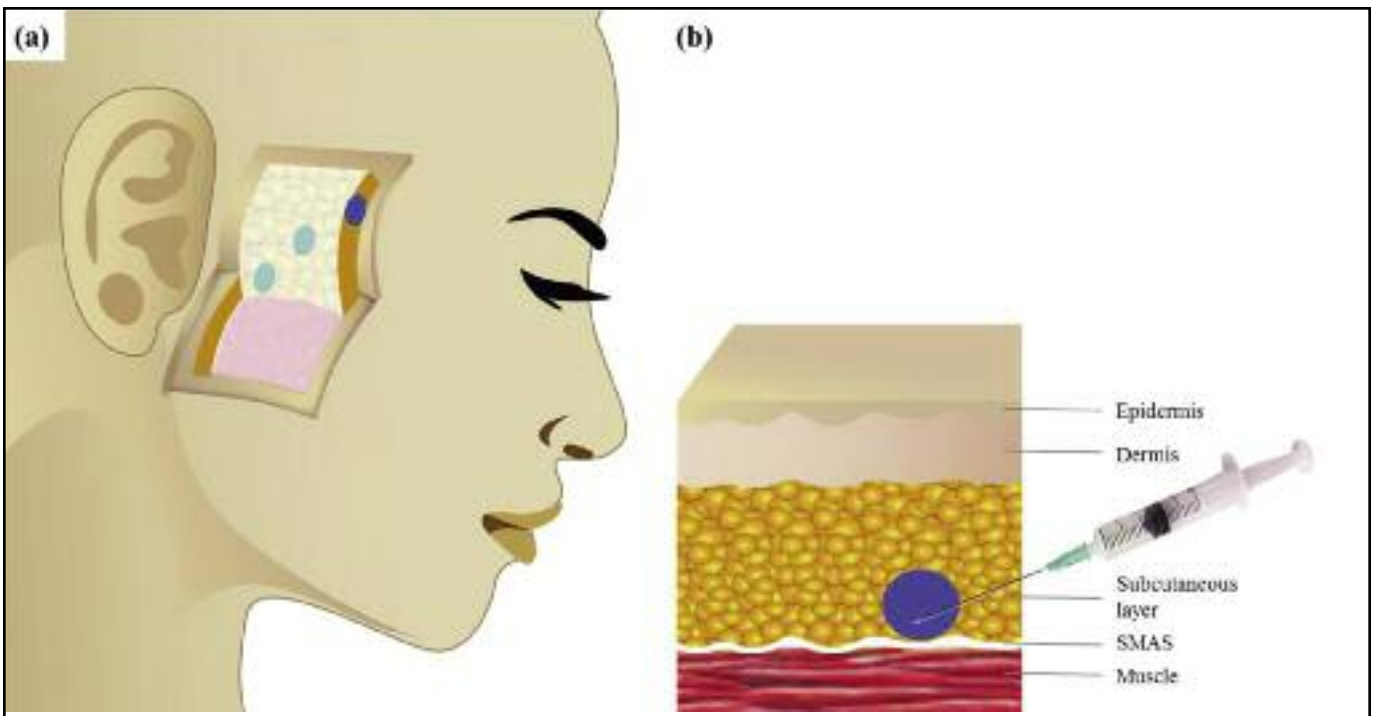


Figure 4. (a,b) An illustration mimicking skin layer. (a) The skin was dissected and flipped upward. Note the masses of HA located above the SMAS layer (white sheet). Light blue circles represented masses of HA visualized through underlying SMAS. (b) Cross-sectional plane: navy blue circle represented HA visualized in the deep subcutaneous layer just above the SMAS "SupraSMAS."

the plane immediately above the SMAS (supraSMAS). The authors selected the lateral side of the face because, in this area, the SMAS is well-formed² and demonstrates greater

stiffness and strength in comparison with more medial parts of the face.¹² With these unique properties, the physician can approach SMAS easier by the sense of resistance when

the tip of the needle touches the SMAS level. The injection plane should be in the subcutaneous layer just above SMAS (Figure 4) because in this layer, there are perpendicularly arranged fibrous septa connected between the SMAS and dermis, which facilitates retention of the injected HA mass. The deposited HA will increase volume in the subcutaneous layer and exert pressure effect pushing down on SMAS tissue in perpendicular axis as shown in the ultrasonogram, thus leading to the shortening of the SMAS at the injection points, which produces simultaneous lifting of the lower face. The authors emphasize this plane above the SMAS because the plane deeper to the SMAS is looser, making it harder to maintain the HA volume effect.

Additionally, the stiffer property of SMAS on the lateral face and presence of retaining ligament, particularly the masseteric ligament, makes the penetration using a sharp needle relatively easier than blunt cannula, allowing the physician less insertion effort and less trauma to the patient. However, if this technique is applied when injecting into areas located more medially where important structures, such as transverse facial artery and facial nerve, lie more superficially, using a blunt cannula may be essential.

In the authors' study, the sonogram image on both sides demonstrated the same supraSMAS location both on the side of step-by-step ultrasound-guided injection and on the side using only final ultrasound confirmation. This finding confirms the accuracy of our injection plane and the reproducibility of this technique. As a result, physicians can perform this injection regardless of the availability of ultrasonography in clinical practice. Furthermore, the sonograms have confirmed the mechanical effect of HA depots on SMAS, supporting the ability of this lifting technique by shortening of the SMAS as the authors postulated.

The authors' patient demonstrated an immediate lifting effect and still displayed the beneficial results at least 26 weeks after only a single 1mL injection of HA. They believe that apart from the pushing effect of HA at the supraSMAS plane, the mechanical stretching from persistence and retention of HA mass may stimulate subsequent neocollagenesis according to a previous study by Turlier et al.¹³

In conclusion, the authors propose an innovative method of lower-face lifting, termed "supraSMAS lift." Although its result may not be completely comparable to traditional rhytidectomy, it is still beneficial to patients, especially those with relatively mild-to-moderate sagging or individuals who prefer a less-invasive, more conservative way to improve the lower face. The unique advantages of this injection technique are its simplicity, less invasiveness,

quicker procedure time, less patient down time, cost-effectiveness, and durable results with minimal morbidity. Physicians can apply this technique as a single injection or as a combined treatment with other techniques, such as filler augmentation or SMAS targeting devices, to achieve optimal cosmetic outcome.

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